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NORMS AND INDEXES OF SOVIET DIESEL FUELS
BY GOSTS 305-42 AND 4749-49

Standartizatsiya, No 6,
 Moscow, Nov-Dec 54

The quality of high-speed diesel fuels in the USSR, at present, is regulated by two standards, GOST-305-42 and GOST 4749-49. Six grades of diesel fuels are produced according to these standards.

GOST 305-42, "Auto Tractor Diesel Fuel, Technical Characteristics," includes the summer-grade L and the winter-grade Z. GOST 4749-49, "High-Speed Diesel Fuel, Technical Characteristics," determines the quality of four grades -- the three seasonal grades of DL, summer grade; DZ, winter grade; and DA, for use in the Arctic regions; and DS, a special grade.

GOST 4749-49 determines the quality of fuel used in the present-day high-speed engines, such as the two-cycle engine produced by the Yaroslavl Motor Vehicle Plant, the maritime fleet engines, the D-6 and V2-300 type engines, and engines used in diesel tractors. GOST 305-42 determines only the quality of fuel used for the old-type diesel tractors.

The table below shows the norms and qualitative indexes of the diesel fuels produced according to these two standards. The qualitative indexes of GOST 305-42 were established when high-speed engines were first introduced and not enough was known about the type of fuel they would require. The norms of the indexes for the fuel produced according to GOST 305-42 are not as high as those for the fuel produced according to GOST 4749-49. Tests have proved that a lighter fraction diesel fuel would have to be made to make engine starting easier, especially during the winter and for use in the Arctic regions. However, the tractor diesel fuel produced according to GOST 305-42 possesses a much heavier fraction during 50 percent distillation up to 300 degrees centigrade than up to 275-290 degrees centigrade, as produced according to GOST 4749-49.

During tests to determine what effect a reduction in viscosity would have on the operation of high-speed diesels, it was thought expedient to make a considerable reduction in the viscosity of fuels used in the winter. The viscosity of winter-grade tractor diesel fuel produced according to GOST 305-42 is higher than that of the summer-grade DL fuel produced according to GOST 4749-49. For the same reason, since the solidifying point of the first-named fuel is poorer than the other, this point was set 10 degrees centigrade higher than for the DL fuel.

The norms for indicators in tractor diesel fuels, such as coking capacity, acidity, and ash content, all of which determine the degree at which scale forms in the motor and the degree of corrosion and wear on parts, are approximately double those of fuel produced according to GOST 4749-49. In setting up this standard, the indexes of GOST 305-42 were temporarily set aside because of the feeling that, as the industry expanded, new methods of production and refining were introduced, and the old stock of engines became reduced, all the high-speed diesel engines would be converted to work on the four grades of fuel produced according to GOST 4749-49.

Although the quality of fuel produced according to GOST 305-42 has not been improved, it is still produced in large quantities. Hence, in several regions the high-speed diesel engines must use low-grade fuel. This problem can be overcome in two ways: (1) by improving the fuel produced according to

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GOST 305-42, and (2) by raising its quality to the level of that of fuel produced according to GOST 4749-49. Except for reducing the norm of sulfur content, this can be readily accomplished. When it is, there no longer will be any need for GOST 305-42.

Abbreviations for kinds of oil used in the following table are: L, summer-grade oil; Z, winter-grade oil; DA, diesel oil for use in Arctic regions; DL, diesel oil for use in the summer; DZ, diesel oil for use in the winter; and DS, diesel oil, special grade.

[Table appears on following pages.]

Indexes	Norms for Grades by GOST 305-42		Norms for Grades by GOST 4749-49			
	L 43	Z 43	DA 40	DZ 40	DL 45	DS 50
Cetane No, min	--	--	200	200	--	--
Fraction composition						
10% distilled at °C, min	--	--	200	200	--	--
50% distilled at °C, max	--	--	255	275	290	280
90% distilled at °C, max	--	--	300	335	350	--
96% distilled at °C, max	--	--	330	--	--	340
% min, distilled up to 300 °C	50	50	--	--	--	--
% min, distilled up to 350 °C	85	85	--	--	--	--
Viscosity at 20 °C						
Kinematic, in cst	5.0-8.5	5.0-8.5	2.5-4.0	3.5-6.0	3.5-8.0	--
Conventional, in deg.	1.4-1.7	1.4-1.7	1.15-1.3	1.25-1.45	1.25-1.7	--
Viscosity at 50 °C						
Kinematic, in cst	--	--	--	--	--	2.5-4.0
Conventional, in deg.	--	---	--	--	--	1.15-1.3
Max % coking capacity	0.1	0.1	.05	.05	.05	.05

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Acidity in mg KOH per 100 ml, max	10	5	5	5	
Max % ash content	.025	.01	.02	.02	
Max % sulfur	1.0	0.2	0.2	0.2	
Test for copper	--				test
Water-soluble acids and alkalis	None				present
Mechanical impurity	None				present
Water content	None				present
Flash point (determined in enclosed fixture), °C, min	65	35	50	60	90
Solidification point, °C, max	-10	-60	-45	-10	-15
Max % of coking capacity of 10% of residue	--	--	0.5	0.5	0.5
Hydrogen sulfide	None	--	--	--	--
Temp of cloudiness, °C, max	--	--	-35	-5	-10

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